**Car Catalogue Management System**

**DFD Level 0 - Context Diagram**

**Overview:** This shows the entire system as a single process interacting with two users.  
**Entities:**

* **Admin** → Manages cars and users.
* **Customer** → Browses, filters and saves favorite cars.

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│ Admin │

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│ Car System │

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│ Authentication │

│ Manage Cars │

│ Browse Cars │

│ Save Favorites │

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│ Customer │

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**DFD Level 1 - Core Modules Breakdown**

**Key System Components:**

**User Authentication** (Signup/Login, Role-Based Access)  
**Car Catalogue** (View, Filter, Sort, Search)  
**Car Details Page** (View Full Car Info, Add to Favorites)  
**Admin Panel** (Add, Edit, Delete Cars, Manage Users)  
**User Dashboard** (View Saved Cars, Manage Profile)

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│ Admin │

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│ Car Management │

│ (Add/Edit/Delete) │

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│ Authentication System │

│ (Login/Signup, Role) │

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│ Car Catalogue │

│ (Filter, Sort, Search) │

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│ Car Details Page │

│ (View, Favorite) │

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│ User Dashboard │

│ (Favorites, Profile) │

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│ Customer │

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**DFD Level 2 - Data Flow Between Components**

**Breakdown of Data Movement & Local Storage Usage**

**User Authentication**

* **Input:** Email, Password, Role Selection
* **Process:** Verify user, assign role (Admin/Customer)
* **Output:** Login success, redirect to dashboard
* **Storage Interaction:** Users Database (Local Storage)

**Car Catalogue**

* **Input:** Search term, filters
* **Process:** Fetch, apply filters/sorting
* **Output:** Display list of cars
* **Storage Interaction:** Cars Database (Local Storage)

**Car Details Page**

* **Input:** Selected car
* **Process:** Retrieve full details
* **Output:** Display specifications, option to favorite
* **Storage Interaction:** Cars Database (Local Storage)

**Admin Panel**

* **Input:** Car details (brand, model, price, year, fuel type, image, etc.)
* **Process:** Save, update, delete car data
* **Output:** Updated catalogue displayed
* **Storage Interaction:** Cars Database & Users Database (Local Storage)

**User Dashboard**

* **Input:** Profile updates, favorite selections
* **Process:** Retrieve user-specific data
* **Output:** Updated profile, saved favorites
* **Storage Interaction:** Favorites Database and Users Database (Local Storage)

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│ User Authentication │

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│ - Login / Signup │

│ - Role-Based Access │

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│ Car Catalogue │

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│ - View Cars │

│ - Filter, Sort, Search │

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│ Car Details Page │

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│ - View Full Details │

│ - Add to Favorites │

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│ User Dashboard │

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│ - View Favorites │

│ - Manage Profile │

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│ Local Storage │

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│ - Users Database │

│ - Cars Database │

│ - Favorites Database │

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**Summary of DFD Explanation**

* **DFD Level 0:** Shows overall system interactions (Admin, Customer, Car System).
* **DFD Level 1:** Breaks down into five major modules (Auth, Catalogue, Details, Admin, Dashboard).
* **DFD Level 2:** Explains how data moves between modules and Local Storage
* **Fully Structured & Modular Design** (Easier to build, scale & maintain).
* **Uses Local Storage Efficiently** (No need for an external database).
* **Optimized for Performance** (Debounced search, lazy loading).
* **Best UI & UX** (Dark mode, animations, mobile-friendly design).